

Claims

1. A safety device for a motor-driven industrial robot, comprising:
 - 5 (a) a power interrupter circuit operative to deactivate a motor, of the motor-driven industrial robot;
 - (b) a sensing element coupled to an end effector of the industrial robot for producing an electrical control signal when the end effector is rotated or is translated in undesirable fashion; and
 - 10 (c) a communication link for coupling the electrical control signal to the power interrupter circuit for controlling an operational state of the industrial robot.
2. The safety device as in claim 1 wherein the sensing element comprises a
15 solid state angular rate sensor.
3. The safety device as in claim 2 wherein the angular rate sensor produces an electrical control signal proportional to the rate of rotation of the end effector about a predetermined axis.
20
4. In a robot for handling products in a three-dimensional space, said robot comprising a main casting from which a plurality of arms are pivotally joined for rotation about a corresponding plurality of axes, the main casting supporting a servo motor connected individually in driving relation to each of the plurality of arms, a base
25 plate suspended from at least one of the plurality of arms where the at least one arm member includes a detachable joint on an opposed end thereof for joining to the base plate at one of the opposed ends, said plurality of arms acting to constrain the base plate to pure translational motion, the improvement comprising:
 - (a) sensing means affixed to the base plate for sensing at least one
30 of inclination and rotation of the base plate and producing an electrical control signal;

and

(b) a control circuit coupled to the servo motors and responsive to said electrical control signal for de-energizing the servo motors.

5 5. The robot as in claim 4 wherein inclination or rotation of the base plate occurs upon separation of the detachable joint coupling the at least one arm to the base plate.

10 6. The robot as in claim 5 wherein the sensing means comprises a solid state angular rate sensor.

15 7. The robot as in claim 6 wherein the angular rate sensor produces an electrical control signal proportional to the rate of rotation of the base plate about a predetermined axis.

20 8. The robot as in claim 7 wherein the control circuit includes a circuit for comparing the electrical control signal to a predetermined threshold value and a switching circuit for inhibiting current delivery to said servo motors when the electrical control signal exceeds said threshold

25 9. The robot as in claim 4 and further including an end effector suspended from the base plate.

30 10. The robot as in claim 8 where said electrical control signal is transmitted via a cable to the control circuit.

 11. The robot as in claim 8 where said electrical control signal is transmitted wirelessly to the control circuit.

12. The robot as in claim 4 where the sensing means is battery powered.